

CLAIMS

1) A suction pump (1) for lifting equipment, comprising an air intake device (2) for drawing in air through an intake port (2a), and an electric motor (3) for rotating said air intake device (2); the suction pump (1) being characterized by also comprising a pneumatic motor (4), and a mechanical connecting member (5) for mechanically connecting the pneumatic motor (4) to said air intake device (2) to rotate the air intake device in place of the electric motor (3).

2) A suction pump as claimed in Claim 1, characterized by also comprising a pressurized-air storage tank (13) selectively connectable to said pneumatic motor (4).

3) A suction pump as claimed in Claim 2, characterized by also comprising an electropneumatic control circuit (14) for controlling electric energy flow from the electric mains to said electric motor (3), and pressurized-air flow from said tank (13) to said pneumatic motor (4) as a function of a number of external electric and pneumatic signals.

4) A suction pump as claimed in any one of the foregoing Claims, characterized in that said mechanical connecting member (5) is a free-wheel connecting device (5) designed to rigidly connect the drive shaft (12) of said pneumatic motor (4) to the shaft (10) of said air

intake device (2) only when the angular speed of the drive shaft of the pneumatic motor is greater than the angular speed of the shaft of the air intake device.

5 5) A suction pump as claimed in Claim 4, characterized in that the drive shaft (9) of said electric motor (3) is connected rigidly to the shaft (10) of said air intake device (2), and the free-wheel connecting device (5) selectively connects the drive shaft (12) of said pneumatic motor (4) rigidly to the
10 drive shaft (9) of said electric motor (3) when the angular speed of the drive shaft of the pneumatic motor is greater than the angular speed of the drive shaft of the electric motor.

 6) A suction pump as claimed in Claim 3,
15 characterized in that said electropneumatic control circuit (14) comprises an electric power line (15) electrically connecting the electric motor (3) to the external electric mains; and an electrically controlled electric cutout device (16), which is normally open, and
20 which is closed by an electric control signal to permit electric energy flow along said electric power line (15).

 7) A suction pump as claimed in Claim 6,
characterized in that said electropneumatic control
25 circuit (14) also comprises a main pipe (17) for connecting the tank (13) to said pneumatic motor (4); a pneumatically controlled main on-off valve (18), which

is located along the main pipe (17), is normally closed, and is opened by a pneumatic control signal to permit pressurized-air flow along the main pipe (17); and an auxiliary control pipe (19) having a first end branch-
5 connected to the main pipe (17), between the tank (13) and the main on-off valve (18), and a second end connected to the control terminal of the main on-off valve (18), so as to supply said main on-off valve (18) with the pneumatic signal controlling switching into the
10 open position.

8) A suction pump as claimed in Claim 7, characterized in that said electropneumatic control circuit (14) also comprises an electrically controlled first auxiliary on-off valve (20), which is located
15 along the auxiliary control pipe (19), is normally open, and is closed, to prevent pressurized-air flow to the control terminal of said main on-off valve (18), by an electric control signal depending on the presence or not of voltage at the terminals of the electric motor (3);
20 and a pneumatically controlled second auxiliary on-off valve (22), which is located along the auxiliary control pipe (19), between the first auxiliary on-off valve (20) and the control terminal of the main on-off valve (18), is normally closed, and is opened by a pneumatic control
25 signal to permit pressurized-air flow along the auxiliary control pipe (19) .

9) A suction pump as claimed in Claim 8,

characterized in that said electropneumatic control circuit (14) also comprises an pneumo-electric transducer (23), the output terminal of which is connected electrically by a cable (24) to the drive
5 terminal of said electric cutout device (16); and a control pipe (25), which is filled with pressurized air as long as the electric motor (3) is to keep the centrifugal compressor (2) running; the input terminal of said pneumo-electric transducer (23) and the drive
10 terminal of said second auxiliary on-off valve (22) both being connected to the control pipe (25), so as to be activated when the control pipe (25) is filled with pressurized air.